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ED 003 575 56

TAPE RECORDED LECTURES IN THE COLLEGE CLASSROOM II - AN EXPERIMENTAL APPRAISAL.

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REPORT NUMBER NDEA-VIIA-470 PUB DATE AUG 61
EDRS PRICE MF-$0.09 HC-$0.72 18P.

DESCRIPTORS- *COLLEGE INSTRUCTION, *TAPE RECORDINGS, *TEACHING TECHNIQUES, *EXPERIMENTAL TEACHING, *TEACHER EDUCATION, SAN FRANCISCO, CALIFORNIA

ONE OF A SERIES OF PILOT STUDIES REPORTED ON THE EFFECTIVENESS OF TAPE-RECORDED LECTURES AT THE COLLEGE LEVEL. STUDENTS ENROLLED IN A REQUIRED COURSE FOR SECONDARY TEACHING WERE TESTED AND GROUPED INTO 18 MATCHED PAIRS. ASSIGNMENTS WERE MADE TO THE TAPED LECTURE (EXPERIMENTAL) AND THE CONVENTIONALLY TAUGHT (CONTROL) GROUPS, 24 AND 12 SUBJECTS RESPECTIVELY. DATA WERE STUDENT REACTIONS, POST-TESTS, AND TEACHER RATINGS. NO SIGNIFICANT DIFFERENCES BETWEEN THE GROUPS WERE FOUND. HOWEVER, CONCLUSIONS WERE DRAWN THAT THE INSTRUCTIONAL METHOD OF TAPED LECTURES SERVED AS AN EFFECTIVE TEACHING TECHNIQUE. (RS)

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Introduction*

Spurred by a nation's quest for ever-improved quality in its educational program, American educators have turned increasing attention in recent years to the instructional possibilities of mass media communication techniques. The rationale underlying this intensified interest in motion pictures, television, and sound recordings is that by the use of these mechanical agents our most capable instructors should be able to reach wider student audiences. This argument has particular appeal in educational situations where overcrowded enrollments make it difficult to secure enough qualified teachers. Besides the convincing logic of their arguments, proponents of mass media instructional techniques are faced with the task of supplying empirical evidence that such methods are educationally effective.

Most recent research dealing with educational applications of the new media has centered upon multi-sensory approaches such as motion pictures and educational television. Relatively little research attention has been given to uni-sensory approaches to instruction such as those featuring the easily and inexpensively operated tape recorder.[1] Allen's recent review (1) of research in the educational applications of sound recordings indicates that few basic studies have been conducted regarding the effectiveness of recordings in teaching factual information.

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*The research reported herein was supported by a grant from the United States Office of Education, Department of Health, Education, and Welfare.

[1]An examination of the research grants awarded under provisions of Title VII of the National Defense Education Act of 1958 indicates that far more investigations dealing with multi-sensory media are being supported than those treating uni-sensory media.

While some investigators have demonstrated the effectiveness of instructional tape recordings with elementary and junior high school pupils (2, 3, 5, 6, 8), almost no research dealing with tape recorded teaching at the college level has been reported. This is particularly surprising, since one might surmise that the more mature college student would be better able to derive educational profit from tape recorded teaching than younger high school and elementary school students, who might consider unanimated recordings a rather drab substitute for a real teacher.

This report describes the second in a series of NDEA supported pilot investigations designed to probe the efficacy of utilizing tape recorded lectures at the college level as a principal method of instruction.

Previous Research

Perhaps a better perspective of the present study can be gained by briefly examining the initial pilot study (7) in this series. The former investigation, conducted in Kansas during the summer of 1960, tested the hypothesis that a graduate level college course could be taught effectively by a series of tape recorded lectures coupled with brief instructor-led discussions. An educational research class was divided into two comparable sections, one of which was taught by a standard lecture-discussion approach while the other was taught primarily by a series of 34 half-hour taped lectures followed by a brief discussion period in which the instructor answered questions in person regarding the taped lectures. On the basis of the two groups' performance on several criterion measures, no statistically significant differences between the tape-taught and conventionally-taught students were found. It was concluded that taped lectures, as employed in the experiment, served as an effective teaching device.

The question of the importance of the instructor-led discussion period, however, was unanswered.

The present study differs from the earlier investigation in that a different course was used for the experiment. More important, the tape-taught students in this experiment had essentially no contact with the instructor. Rather, instruction was carried on exclusively by tape recorded lectures followed by student-led discussions. In the present study, therefore, the tape recorded lectures played an even more prominent role in the learning process than in the Kansas investigation in which the instructor, in person, was able to subsequently clarify material in the recorded lectures.

Method

The Variables. The independent variable in the experiment was method of instruction, that is, instruction by a conventional lecture-discussion approach versus instruction by a series of tape recorded lectures coupled with student-led discussions.

The principal dependent variable in the investigation was student achievement, i.e., student mastery of content covered in a pre-service teacher education course, Principles of Secondary Education. In addition, other dependent variables included student reaction to the method of instruction, student scores on an educational attitude inventory and, finally, student attendance.

Certain variables were employed for control purposes since they were considered relevant to the dependent variable under consideration. The principal control variables were students' intellectual aptitude and pre-course knowledge of the subject matter. In addition, students' sex, age, teaching experience, and previous credit in education courses were also designated as control variables.

The Measures. The primary measure utilized in the experiment was a 100-item examination covering the basic content of the course in Principles of Secondary Education. This examination, constructed and refined by informal item analysis over a period of several years at a different college, consisted of 100 multiple choice items based upon the four following content areas: history of secondary education; philosophy of secondary education; curriculum of the secondary school; and special problems and programs of the secondary school (e.g., guidance, student activities, teacher preparation, public criticism).

The measure of intellectual aptitude employed in the investigation was the Wonderlic Personnel Test (9). This test is a briefly administered index of intellectual ability and correlates highly with other group measures of intelligence.

A rating scale designed to assess student reaction to instructional method employed in the course was specially designed for the present study.[2] Students were asked to contrast the instructional method employed in their section of the course, i.e., tape-taught or conventionally-taught, with other courses they had previously completed which were of a generally comparable nature (not just education courses). Students were to rate the instructional method used in terms of (a) its effectiveness in facilitating learning, (b) its effectiveness in promoting interest in the subject matter area, and (c) its effectiveness in facilitating enjoyment of the course itself. Students were instructed to indicate whether the instructional method employed in their section of the course

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[2]A copy of the Instructional Method Rating Sheet is included in Appendix A.

was much better, better, about the same, worse, or much worse than the instructional methods they had experienced in comparable courses.

On an almost wholly experimental basis, the Educational Opinion Inventory was used in the investigation. This instrument, a product of a recent doctoral dissertation (4) has received practically no empirical validation as yet. The device purports to measure teacher's "cognitive merit" which is defined as " . . . teacher's competence in the sense of helping pupils achieve the cognitive objectives of public education."

Finally, since it was believed that without the instructor's presence students in the tape-taught section might miss more classes, absences were recorded by requiring every student to sign his name on an attendance sheet at each class meeting.

Research Sample. The research sample for the investigation consisted of 36 credential candidates enrolled during the 1961 Spring semester in an evening class of Principles of Secondary Education, a course in the San Francisco State College extended late afternoon and evening program. This three unit course is a requirement in the College's credential sequence leading to California certification for secondary school teachers. The writer served as the instructor in the course.

Procedure. During the first class meeting of the semester, students were informed of the experiment in which they would be involved. After a general description of the proposed investigation was presented by the instructor, students were requested to complete the 100-item achievement test, the Wonderlic Personnel Test, the Educational Opinion Inventory, and personal data cards.

Using the achievement and intelligence measures as principal matching indices, 18 matched pairs[3] of students were designated. Chi square analyses

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[3]Matching data for the 18 pairs are presented in Appendix B.

revealed no significant differences between the two groups with respect to sex, age, previous teaching experience, or number of units completed in professional education courses.

A final consideration involved in selecting the matched pairs was a student's preference regarding participation in the section of the class which was to be taught primarily by tape recorded lectures. Students were asked to respond to a question on the personal data cards asking if they would be willing to participate in the tape-taught section of the class. Twelve students preferred not to be placed in the tape-taught section and, accordingly, were all assigned to the conventionally-taught section. While the honoring of student preferences in this matter introduces another variable into the experimental design, it was believed important to replicate, as nearly as possible, an actual educational situation in which few students who express prior disapproval of tape recorded teaching would be expected to enroll in a tape-taught course.

At the beginning of the second class meeting the names of students assigned to the two sections were announced. Those students in the section to be taught in person by the instructor adjourned to another classroom. At no time following the early moments of the second class session did the instructor meet with the tape-taught section until the final class meeting of the semester when terminal examinations were administered.

A graduate assistant, not enrolled in the course, was designated as discussion leader and operator of the tape recorder in the tape-taught section. The discussion leader was instructed not to serve in any sense as an instructor-surrogate, but to play the role only of a group leader. Since the graduate assistant had not previously completed the particular

course and had no more familiarity with the course content than the regularly enrolled students, it was assumed that his role might have been filled in other learning situations (extension courses in remote localities, for example) by one of the students in the course.

During the first part of each two hour and 45 minute class meeting the tape-taught students listened to a recorded lecture lasting approximately 60-70 minutes. All lectures were recorded by the instructor one or two weeks in advance and covered the same course content as that treated in the conventionally-taught section. A ten-minute recess was taken at the midpoint of the recorded lecture. Following the lecture, students remained for approximately an hour and 30 minutes to discuss the topic treated in the evening's lecture or, possibly, those topics treated in previous lectures. As instructed, the student discussion-leader exercised minimal directive powers and allowed the discussion to range largely at the will of the group.

In the conventionally-taught section, conducted as a standard lecture-discussion, students met for the same period of time and dealt with the same topics as their tape-taught counterparts. No regular text was used for either section of the course. Instead, three books were to be selected from a recommended reading list and critically reviewed by each student. These reviews were submitted on three separate occasions during the semester. A brief mid-semester essay examination was administered to both sections, largely for college grading purposes, but the results were not subjected to comparative analysis.

At the next-to-last meeting of the semester, tape-taught students were asked to supply anonymous reactions to the instructional approach employed during the semester. During the final class meeting both sections met in one room where the achievement test and the Educational Opinion Inventory

were re-administered. The Instructional Method Rating Sheet was also completed by each student.

Analysis. The matching procedure used in composing the two sections of the class assured the general comparability of the groups with respect to intellectual aptitude and previous knowledge of the subject. Even so, the post-achievement performance of the two sections was tested for significance of differences by analysis of covariance, a statistical technique which permitted more precise compensation for group difference in performance on the pre-experiment achievement examination and the intelligence measure.

Differences between the two groups with respect to the instructional method ratings were tested by chi square analysis. Differences between the gain scores of the two groups on the Educational Opinion Inventory were assessed by the Mann-Whitney U Test. Attendance differences between the two sections were treated by a binomial significance test. Product-moment correlation coefficients between the measures involved in the achievement analysis were also calculated.

Results

Performance of the tape-taught and the conventionally taught students on the several dependent variables will be contrasted separately.

Achievement. The principal dependent variable considered in the study was post-experiment achievement. As an initial step in the analysis, the measures involved in testing for achievement differences were correlated. These correlations are presented in Table 1. The correlation between post-achievement and the intelligence test ($r=.41$) and between post-achievement and pre-achievement ($r=.40$) were both significant beyond the .05 level.

Table 1 - Intercorrelations of 36 Students' Scores on the Wonderlic Personnel Test, the Achievement Pre-test, and the Achievement Post-test.

Measures	r
Wonderlic —— post-achievement	.41*
Pre-achievement —— post-achievement	.40*
Wonderlic —— pre-achievement	.17

*Significant beyond .05 level.

Although both sections evidenced a significant increase in performance on the achievement examination (tape-taught section pre-test mean = 38.78, post-test mean = 75.22; conventionally-taught section pre-test mean = 39.83, post-test mean = 75.44), there was no significant post-experiment achievement difference between two sections. The results of the covariance analysis are presented in Table 2.

Table 2 - Analysis of Covariance for Tape-taught and Conventionally-taught Students' Post-test Achievement Performance, Controlling for Pre-test Achievement and Wonderlic Personnel Test Scores

Source of Variation	Residuals			F
	D.F.	S.S.	M.S.	
Between	1	1.80	1.80	.04
Within	32	1282.60	40.08	
Total	33	1284.40		

Instructional Method Ratings. At the close of the experiment, students rated the instructional method employed in their section in terms of its effectiveness in facilitating learning, in promoting interest in the subject matter area, and in facilitating enjoyment of the course. To provide a comparative base, students were instructed to contrast the instructional method with that employed in other courses they had previously completed which were of a generally comparable nature. Results of these ratings are shown in Table 3.

Table 3 - Ratings by Tape-taught and Conventionally-taught Students of Their Section's Instructional Method in Contrast with Previously Completed Courses of a Comparable Nature

Item	Group	Rating				
		Much Better	Better	About the same	Worse	Much Worse
Learning						
	Tape-taught	0	13	4	1	0
	Conventionally-taught	6	7	5	0	0
Interest in Subject						
	Tape-taught	4	6	7	0	1
	Conventionally-taught	10	5	3	0	0
Enjoyment of Course						
	Tape-taught	4	7	4	3	0
	Conventionally-taught	10	3	4	1	0

Although an inspection of Table 3 will reveal higher ratings on all three indices by the conventionally-taught students, chi square analysis revealed no significant differences between the groups.

Educational Opinion Inventory. Gain scores of the two groups were compared on the experimental version of the Educational Opinion Inventory by a Mann-Whitney Test. There was no significant difference between the score changes of the two groups on this measure, $z = .68$.

Attendance. Although, contrary to expectations, the conventionally-taught students registered more absencees from class than the tape-taught students (18 to 11), a binomial test indicated no significant differences, $z = 1.12$.

Reactions of Tape-taught Students. As might be inferred from the previously described instructional method ratings, anonymously supplied reactions of the tape-taught students regarding the taped lecture learning

experience were generally favorable. Among the advantages noted for the experimental approach were (a) better organization of lecture material than in a typical class, (b) superior opportunity to take lecture notes, (c) post-lecture discussion situation induced greater need for self-study and critical judgment, (d) relaxed atmosphere yielded by instructor's absence promoted free expression of ideas. Disadvantages of the taped lecture method cited by students included (a) instructor could not clarify lecture material, (b) danger of a few students dominating discussion periods, (c) occasional monotony of lecture tapes, (d) no opportunity to communicate to the instructor disagreement with his expressed positions.

Discussion

As in the earlier Kansas study the lack of significant differences between the conventionally-taught and tape-taught students allows the conclusion that the recorded lecture approach employed in this experiment served as an effective instructional method. This result occurred even though the instructor, other than through recorded lectures, removed himself almost completely from the tape-taught students. While results of only two studies, each with relatively small student samples, cannot be considered conclusive in any sense, outcomes of both investigations supported the efficacy of tape recorded instruction in terms of the criterion measures employed.

It should be apparent that the effectiveness of tape recorded instruction may be a function of a particular instructor's ability to use this medium to effectively communicate with his students. In pilot studies involving but a single instructor, no opportunity to test the effectiveness of other professors was afforded. Such a test would clearly need to be conducted before one might register a favorable educational judgement regarding tape

recorded teaching.

Another question to be raised concerns the basic difference, if any, between tape recorded instruction and more conventional correspondence courses, perhaps conducted on a small group basis. Is the instructor's ability to apply verbal emphasis and a certain amount of personal imagery sufficiently advantageous to warrant the use of recorded instruction over correspondence-type study? Comparative studies of these two techniques must also be undertaken.

In conclusion, results of the two pilot investigations of taped instruction suggest that there may well be a legitimate place for this type of teaching at the college level. Further research will be needed however, to confirm this suggestion as well as to define limits of the particular types of instructional tasks for which tape recorded instruction may be appropriate.

Summary

An experiment was carried out which contrasted the effectiveness of a conventional instructional method versus a method based upon tape recorded lectures plus student-led discussions. Subjects for the pilot experiment were 36 students enrolled in a pre-service teacher education course at San Francisco State College. The conventionally-taught section was instructed by a standard lecture-discussion approach. The tape-taught section listened to hour long taped lectures and discussed the content of the lectures with the assistance of a student discussion leader. After the initial meeting of the semester the instructor had essentially no contact with the tape-taught students. On the basis of group performanne on several criterion measures, no significant differences between the conventionally-taught and tape-taught students were found. It was concluded that the instructional method featuring the taped lectures served as an effective teaching technique.

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APPENDIX A

INSTRUCTIONAL METHOD RATING SHEET

Directions: Do not sign your name, but be sure to identify the section you were in by circling one of the two cited below:

Circle one: (A)Taped lectures plus discussions section

(B)Conventionally taught section

In responding to the items below please endeavor to concentrate on the method of instruction employed in the class, rather than the actual content of the course. In other words, try to disassociate the instructional method from the subject matter of Principles of Secondary Education.

1. Contrasting this course with other courses you have taken which were of a generally comparable nature (not just education courses), please rate the instructional method used in the class in terms of its effectiveness in facilitating your learning.

Check one:
_____ Much better
_____ Better
_____ About the same
_____ Worse
_____ Much worse

2. Using the same comparison as in question one, rate the course instructional method in terms of its effectiveness in promoting your interest in the subject matter area.

Check one:
_____ Much better
_____ Better
_____ About the same
_____ Worse
_____ Much worse

3. Using the same comparison as in the previous questions, rate the course instructional method in terms of its effectiveness in facilitating your enjoyment of the course.

Check one:
_____ Much better
_____ Better
_____ About the same
_____ Worse
_____ Much worse

4. If there are any additional comparisons you wish to make, please do so in the space below.

APPENDIX B

Matching Data for the 18 Matched Pairs

Pair Number	Conventionally-taught		Tape-taught	
	Wonderlic	Pre-Achievement	Wonderlic	Pre-Achievement
1	21	47	24	42
2	21	43	23	41
3	23	29	26	30
4	23	37	25	39
5	26	41	26	38
6	26	34	25	32
7	26	44	27	45
8	30	38	31	38
9	30	33	30	38
10	31	47	29	43
11	31	36	28	30
12	32	34	30	33
13	32	38	33	39
14	32	49	30	47
15	34	35	34	34
16	35	40	35	35
17	37	46	35	50
18	39	46	38	44